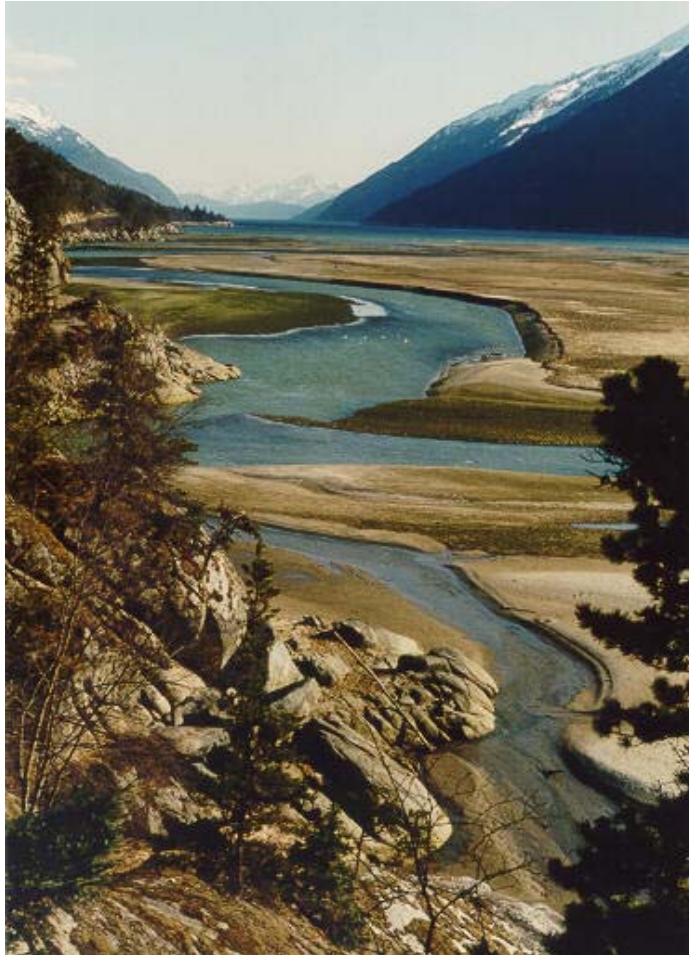


Waterbird and Breeding Landbird Inventories in Klondike Gold Rush National Historical Park



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National Park Service
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Inventory and Monitoring Program

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Final Report

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Abstract

Funding from the National Park Service (NPS) Inventory & Monitoring Initiative and Klondike Gold Rush National Historical Park (KLGO) was used to carry out park-wide waterbird and breeding landbird inventories in 2003. The breeding landbird survey protocol which follows the Alaska Landbird Monitoring System (ALMS) methodology was developed by an avian ecologist at the United States Geological Survey (USGS), Biological Resources Division, Alaska Science Center. The survey was coordinated by the KLGO Natural Resources Program Manager, and field surveys were conducted by KLGO biological technicians and a U.S. Fish & Wildlife Service (USFWS) biologist. Two previously established Off-Road Breeding Bird Survey (ORBBS) routes consisting of 24 survey points were incorporated into the inventory design. An additional 28 points were added so that survey points would be distributed across the park's strong elevational and ecological gradients. Six of the park's seven primary plant associations were sampled, and survey points ranged from sea level to 1,200 m (4,000 feet) elevation. Waterbird surveys were conducted weekly in the spring (late April-May) and biweekly during fall (August-mid September). Over the course of these inventories, 56 bird species (in 25 families) were recorded during point counts, and 39 species of waterbirds (in nine families) were observed during waterbird surveys, bringing the total number of bird species observed during field surveys to 90. In addition to systematic surveys, we also documented incidental observations made by NPS biologists and other knowledgeable birders. Through these efforts, we were able to document 21 new bird species for KLGO (bringing the total number of documented species to 158) and confirm the occurrence of 91% of the bird species expected in the park. Considerable numbers of migrating birds were observed during spring in the upper Taiya Inlet, indicating the importance of the Taiya River estuary as a stop-over and/or staging area for migratory waterbirds. Utilizing the results of this effort, a revised bird checklist and an atlas database are being developed for the Taiya and Skagway River watersheds in collaboration with the Skagway Bird Club. Results of this study will also be used to develop a strategy for long-term monitoring of landbird and waterbird population trends and habitat associations in the park as part of the NPS Vital Signs Monitoring program.

Key Words: Alaska, Alaska Landbird Monitoring System, breeding birds, inventory, monitoring, Klondike Gold Rush, landbirds, waterbirds, point counts

Suggested Citation

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Introduction

Klondike Gold Rush National Historical Park (KLGO) is located at the northern terminus of Alaska's Inside Passage, and is part of the Southeast Alaska Inventory & Monitoring Network (SEAN) along with Sitka National Historical Park and Glacier Bay National Park and Preserve. Although KLGO was established in 1976 to preserve the historic structures and trails associated with the Klondike Gold Rush of 1898-99, the park also contains dynamic and diverse natural resources. Klondike Gold Rush is a relatively small park by Alaska standards, with scattered landholdings in three separate park units totaling 53 km² (13,191 acres). Despite its small size, the park's unique geographic setting and climate make it one of the most biologically diverse areas in Alaska (Pojar and MacKinnon 1994, MacDonald and Cook 1999).

Although KLGO is located within the Northern Pacific Rainforest Bird Conservation Region (BCR), it also borders the Northwestern Interior Forest BCR, placing the park in a transition zone between two ecologically divergent geographic regions with distinct associations of avifauna (NABCI 2000) (Figure 1). The Northern Pacific Rainforest BCR is characterized by a temperate maritime climate and extensive coniferous forests dominated by western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*). The predominantly steep, rocky coastline is periodically interrupted by river valleys and estuarine and freshwater wetlands that provide critically important breeding, migration and wintering habitat for populations of both waterbirds and landbirds (NABCI 2000).

The Northwestern Interior Forest BCR is an ecologically diverse region with an array of habitats including boreal forests dominated by black spruce (*P. mariana*), white spruce (*P. glauca*), paper birch (*Betula papyrifera*), and poplars (*Populus* spp.). There are also extensive areas of non-forest including tall shrub, alpine dwarf scrub, and shrub-graminoid communities. This BCR supports internationally significant populations of breeding shorebirds, waterfowl, and passerines (NABCI 2000). The portion of the Northwestern Interior Forest BCR bordering KLGO is characterized by high-elevation, mountainous terrain and alpine plant communities. These areas provide breeding habitat for several landbird species that rarely breed in the cool, wet coastal rainforests of Southeast Alaska.

In 2000 the SEAN determined that the top priority bird inventory for the network would be breeding landbirds and waterfowl/shorebirds at KLGO due to the low number of existing records from reliable birders and the high diversity of bird species expected for the park. The expected bird species list developed by the Alaska Natural Heritage Program for KLGO contained 162 species with 137 (85%) documented as present (Lenz *et al.* 2001). The documented species list relied heavily upon observations by birders of unknown expertise and survey data by expert birders was minimal. The SEAN identified two species groups for which KLGO could improve documentation of expected avifauna: breeding landbirds and shorebirds/waterfowl (Sharman *et al.* 2000). It was believed that KLGO could meet the goal of documenting 90% presence/absence for

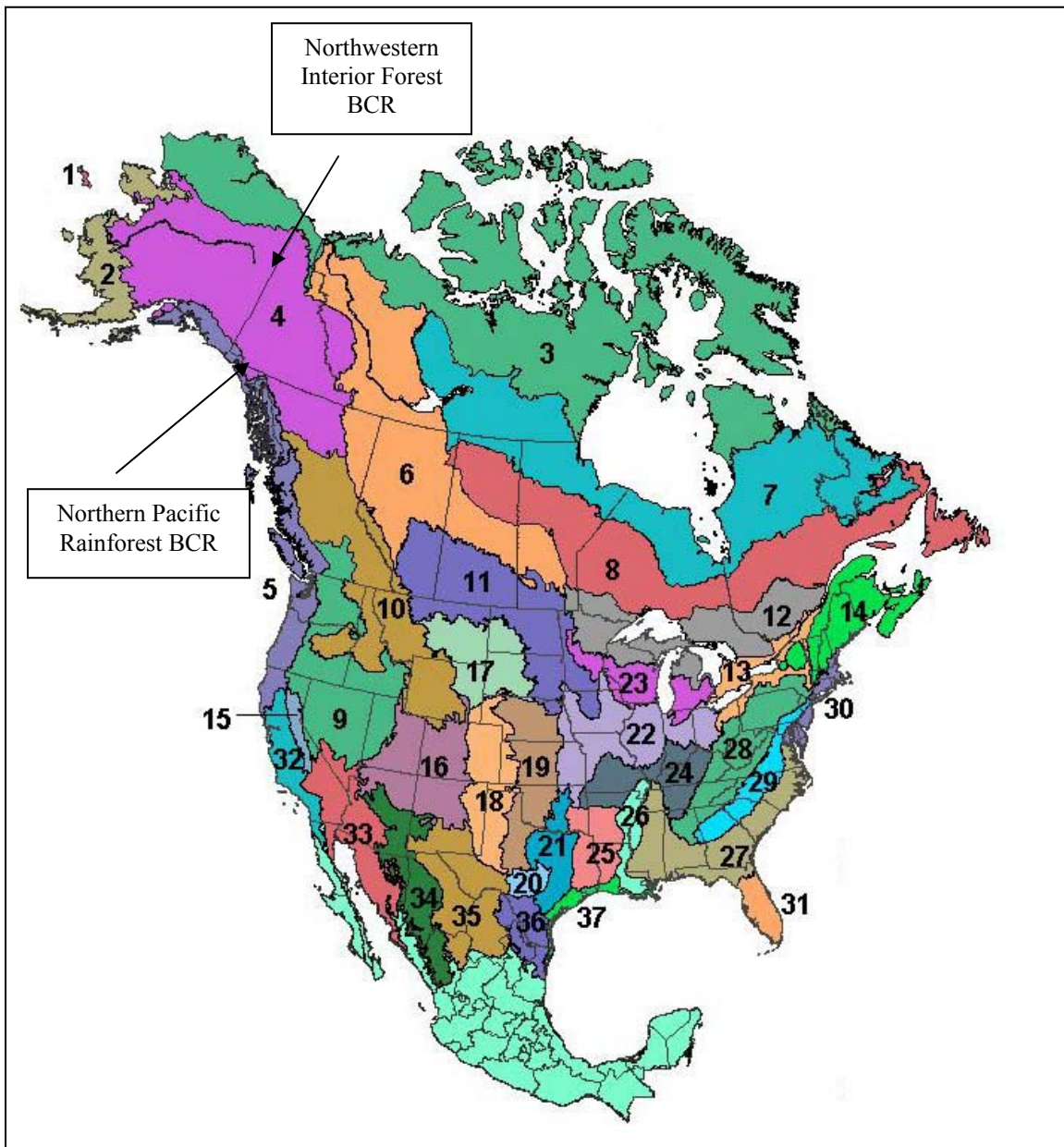


Figure 1. North American Bird Conservation Initiative (NABCI) Bird Conservation Regions (BCR) and location of Northern Pacific Rainforest and Northwestern Interior Forest BCRs (NABCI 2000).

shorebirds/waterfowl by compiling existing data rather than conducting field surveys. As a result of that data mining effort, five additional shorebird/waterfowl species were confirmed for the park (Hahr 2002). The review of historic information revealed that peak numbers of seabirds and migrating waterbirds (coastal waterbirds [gulls and terns], wading birds [herons], marshbirds [loons, grebes, coots, and cranes], shorebirds, and waterfowl) appeared to coincide with the spring eulachon (*Thaleichthys pacificus*) run usually occurring in late April and early May. Eulachon are a small, anadromous smelt that gather in large numbers off of the mouths of their spawning streams in spring, and are an important prey species for a variety of marine fishes, birds and mammals including salmon, sea lions and bald eagles (*Haliaeetus leucocephalus*) (ADFG

2004). Large numbers of waterbirds and bald eagles had been observed in the Taiya River estuary during these months (Edmonston 1981), underscoring the importance of this area as a stop-over for migrating waterbirds en route to breeding grounds further north and as a foraging ground for seabirds and bald eagles.

The 2002 data mining effort revealed that existing information on waterfowl and shorebirds was very limited and relied heavily on systematic surveys conducted by NPS staff in the early 1980s. The 2002 investigators concluded that with little additional effort, spring and fall waterbird migration in the upper Taiya Inlet could be studied in conjunction with the breeding landbird inventory. It was determined that field surveys carried out by experienced NPS biologists and technicians had the potential to yield significantly more credible information on the occurrence of waterbirds than the park was able to compile through data mining alone (Hahr 2002). Using park base funds, KLGO decided to develop a waterbird survey protocol for the upper Taiya Inlet and begin inventorying park waterbirds in 2003.

Information about breeding landbirds at KLGO was derived from two primary sources: the Boreal Partners in Flight (BPIF) Off-Road Breeding Bird Survey, and the North American Breeding Bird Survey (BBS). Two ORBBS routes have been conducted in KLGO since 1995 and 1998, and one BBS route which includes stops along roads in KLGO was conducted in the 1990s but became inactive in 2000. In order to most effectively inventory and monitor breeding landbirds in the park, KLGO sought the assistance of USGS Alaska Science Center Research Wildlife Biologist Colleen Handel in 2002 to create a detailed sampling design as part of an inventory and monitoring protocol for the park. Development of the sampling design included consultation with KLGO to assess habitats and terrain within the study area. Survey methods followed those established for the Alaska Landbird Monitoring System (ALMS). The KLGO Natural Resource Program Manager coordinated the inventory and supervised lead field technician Todd Trapp, who had more than eight field seasons of experience conducting point counts using similar methodologies. USFWS biologist Deb Rudis conducted both ORBBS surveys (now incorporated in the ALMS) in 2003, her fifth year of monitoring these routes.

Goals and Objectives

The goal of this project was to document the occurrence of 90% of the species of waterbirds and breeding landbirds likely to occur in Klondike Gold Rush National Historical Park. The principal objectives of this project were to develop scientifically valid sampling designs for inventorying waterbirds and breeding landbirds in KLGO, and to collect baseline information on bird species occurrence, distribution, abundance, and habitat associations in the park.

Methods

Study Area

Klondike Gold Rush NHP is located in northern Southeast Alaska, approximately 90 miles north of Juneau (Figure 2). The park lies within the Coastal Rainforest Division (Northern Coast Mountains or Boundary Ranges Ecoregion) – a large ecosystem defined by a maritime climate, granitic mountains, ice fields, glaciers, and lush coniferous forests (Nowacki *et al.* 2002).

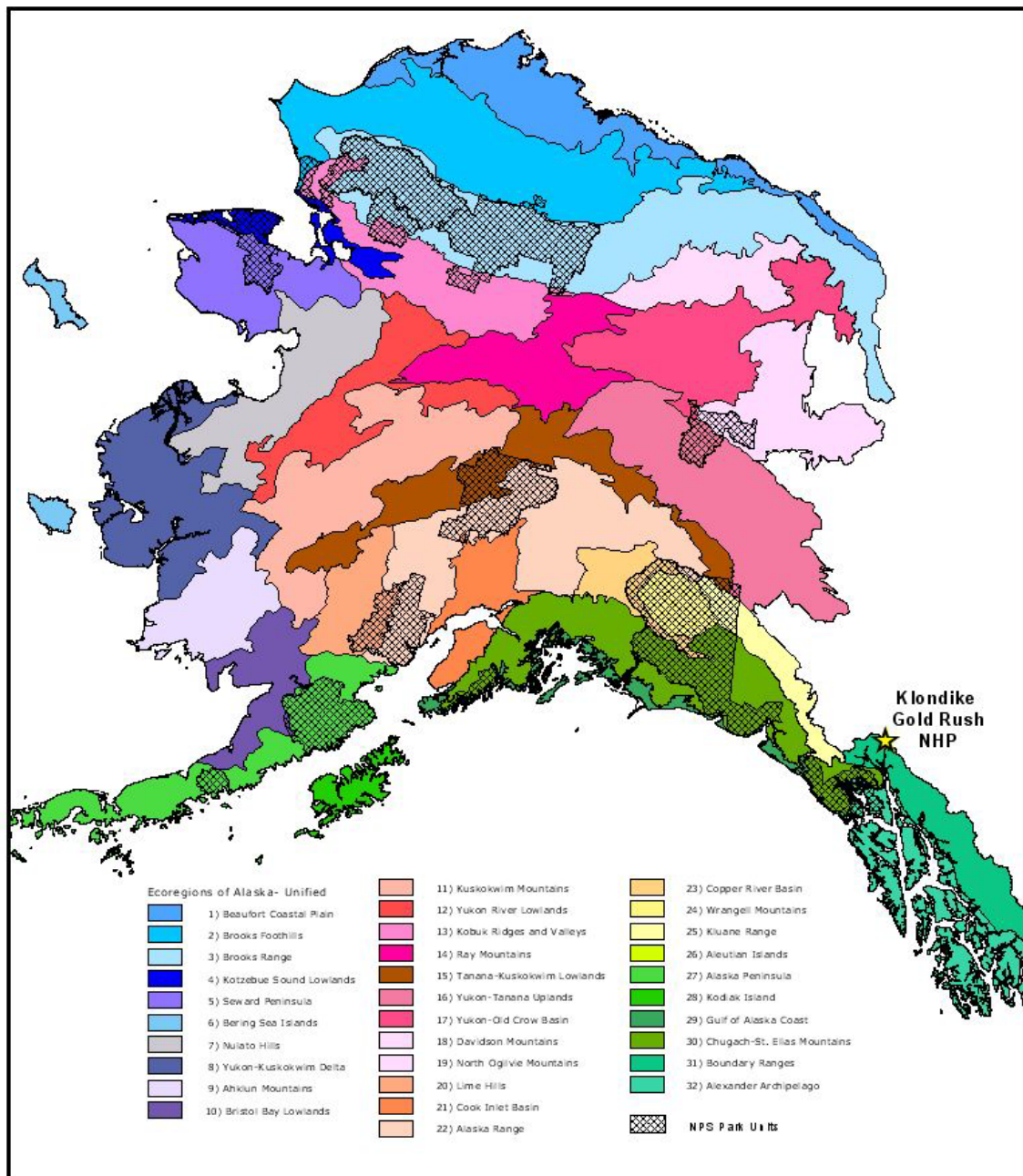


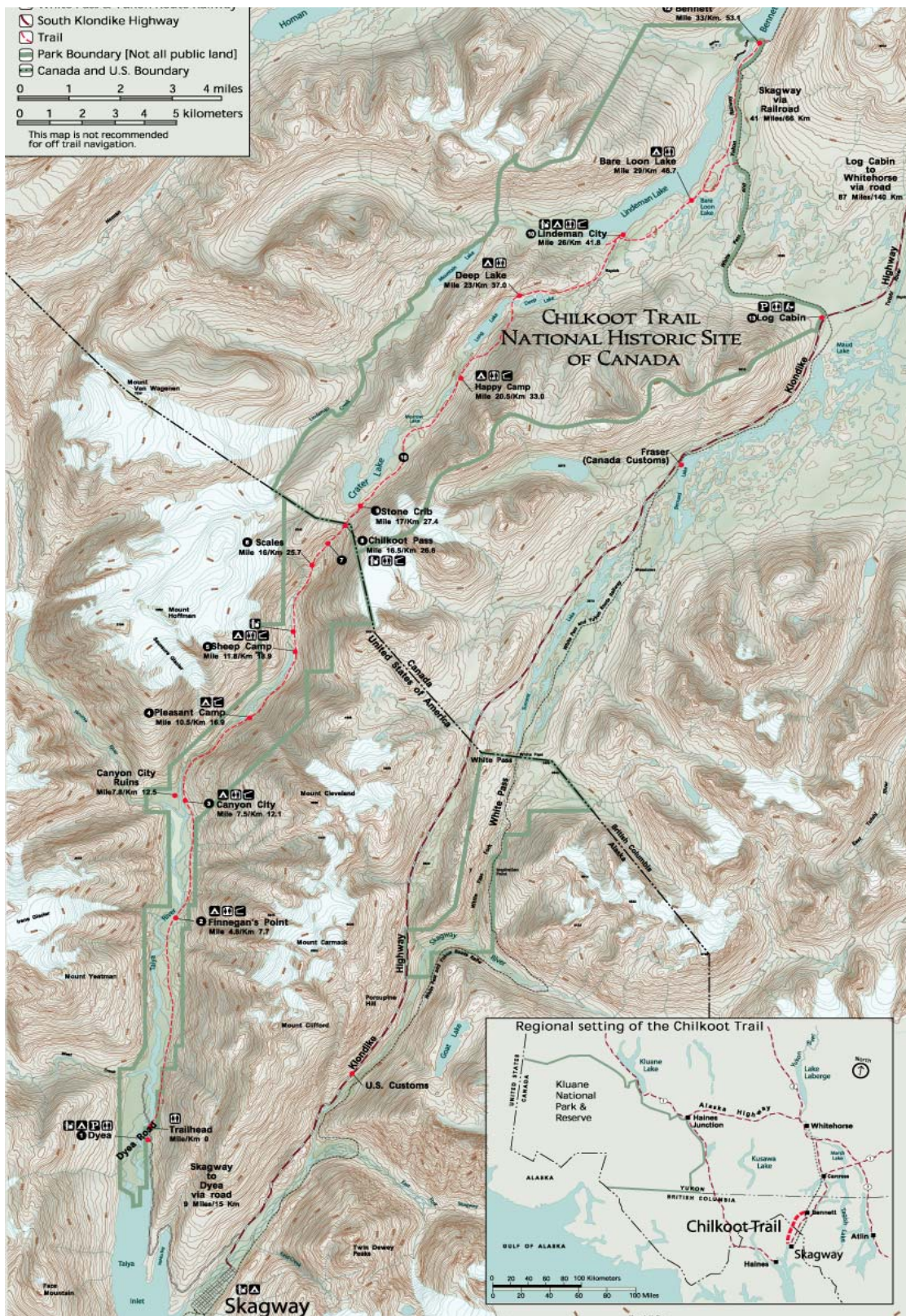
Figure 2. Map of Alaska Ecoregions and NPS park units (Nowacki *et al.* 2002).

The park is comprised of three separate but related units: Skagway (Skagway Historic District), Chilkoot Trail, and White Pass. The three units cover a total of 53 km² (13,191 acres). The park is bounded to the south by the upper Taiya Inlet, a deep, narrow mountainous fjord forming the northern end of the Lynn Canal, and to the north by the U.S./Canada international border. The KLGO boundary encompasses portions of both the Taiya and Skagway river systems which are characterized by U-shaped valleys, high-relief mountains, strong ecological gradients, narrow floodplains, and valley glaciers (Figure 3). The Taiya River watershed contains the Chilkoot Trail Unit of the park, while the Skagway River watershed contains the White Pass Unit and Skagway Historic District.

The upper Taiya Inlet lies deep within the Coast Range batholith of SE Alaska in the Chilkat Complex ecological subsection, and the bedrock geology consists of granitics dominated by granodiorite. Surficial geology is also derived primarily from granitics in the form of glacial, colluvial and alluvial deposits with some glaciomarine deposits found in uplifted estuaries (Paustian *et al.* 1994).

The Chilkoot Trail Unit begins at sea level at the head of Taiya Inlet at the mouth of the Taiya River where there is a relatively large tidal wetland complex consisting primarily of graminoid-forb meadows and salt marsh. Glacial rebound in this region is occurring at a rate of 2 cm per year, resulting in relatively rapid successional change as Sitka spruce forest colonizes the uplifted land. Beyond these wetlands, the Chilkoot Trail Unit passes through extensive black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) - Sitka spruce riparian bottomlands. On the drier, more stable hillslopes, the western hemlock - blueberry (*Vaccinium* spp.) community type predominates. The floodplain continues in the cottonwood/Sitka spruce cover type for approximately 19 km until Sheep Camp (elevation 300 m) where the Chilkoot Trail Unit changes to a mix of stunted western hemlock, subalpine fir (*Abies lasiocarpa*), birch and poplars, as well as a variety of shrubs dominated by mountain hemlock (*T. mertensiana*), alder (*Alnus* spp.), and willow (*Salix* spp.). The northernmost section of the Chilkoot Trail Unit transitions to alpine meadow and lichen-rock outcrop with an abrupt elevational gradient up to Chilkoot Pass (elevation 1,097 m). The alpine is characterized by early successional species, and is dominated by mountain-heather (*Cassiope* and *Phylodoce* spp.) following recent glacial retreat with scattered ponds and nearby alpine lakes on the Canadian side of the pass. The Chilkoot Trail Unit ranges in elevation from sea level to 1,200 m, and the Chilkoot Trail bisects this unit of the park.

The White Pass Unit consists of black cottonwood - Sitka spruce bottomlands, subalpine fir and western hemlock at the mid-elevations (400 - 700m), stunted scrub-shrub vegetation at the higher elevations (700 - 900m) transitioning to alpine meadow and lichen-rock outcrop above treeline (2,500 m). Like the Chilkoot Trail Unit alpine, the White Pass Unit alpine has scattered



krummholtz patches of mountain hemlock and subalpine fir. The alpine is characterized by dense mats of crowberry (*Empetrum nigrum*) and mountain-heather with scattered ponds. The White Pass and Yukon Railroad follows the Skagway River and White Pass Fork, and bisects the White Pass Unit. The Klondike Highway borders on the west. The White Pass Unit ranges in elevation from 450 m to 1,070 m. Vegetation in both the Skagway and Taiya valleys is classified as temperate rainforest, but environmental conditions in these valleys are much different from elsewhere in Southeast Alaska due mainly to reduced rainfall and the unique continental - maritime climate (Paustian *et al.* 1994). Average annual precipitation in the Skagway area is only 66 cm, while rainfall in other parts of Southeast Alaska approaches 500 cm per year. Consequently, species such as the collared pika (*Ochotona collaris*) and arctic ground squirrel (*Spermophilus parryii*) are able to inhabit the relatively dry Skagway area yet are scarce or absent throughout most of Southeast Alaska where abundant precipitation creates environmental conditions that are unsuitable for these and other “interior” species (Paustian *et al.* 1994).

The Skagway Unit of the park consists of the Skagway Historic District which encompasses the gold rush era portion of downtown Skagway, and is bounded on the east by Pullen Creek and on the west by the Skagway River. The unit sits along the upper Taiya Inlet at the Skagway River delta and is adjacent to an improved deep-water harbor. Skagway supports 862 year-round residents, but swells to 2,400 residents during the peak summer tourist season. Klondike Gold Rush NHP and Skagway receive over 700,000 visitors annually, making KLGO the most-visited park in the Alaska Region and Skagway the 16th busiest cruise ship port in the world.

Sampling Design and Survey Methods

Breeding Landbirds

The ALMS is a new protocol sponsored by BPIF and the USGS. The protocol was developed in an effort to gain a more comprehensive understanding of bird abundance and habitat associations in Alaska over time, as well as distribution and species assemblages. It is the offspring of the Alaska ORBBS pilot project. The primary objectives of the ALMS are to (1) monitor long-term population trends at the ecoregional scale, and relative to changes in the ecosystem, (2) determine abundance of species by habitat, and (3) quantify the importance of key habitats through species assemblages. The main goal of the ALMS is to be able to detect a 50% decline (2.7% per year) of a population over 25 years with a 90% probability of detection (Handel 2003a). As part of the ALMS sampling design, the entire state of Alaska (with the exception of the Aleutian Islands and some Bering Sea Islands) was overlaid by a virtual 10 km by 10 km sampling grid. A random rank sample of blocks was selected within each ecoregion in the state for long-term monitoring. Half of the blocks will be sampled in even years and half sampled in alternate years.

Due to the random nature of this design and KLGO's small size, the ALMS sampling grid did not incorporate the park, so an individualized sampling scheme was required. A subset of grids was overlaid on the park, and points were randomly selected in order for the park to participate in the ALMS inventory and monitoring effort. In addition to monitoring the two established ORBBS routes in the park, four additional routes were created within the survey grids with points distributed in proportion to available land cover types (Figure 4).

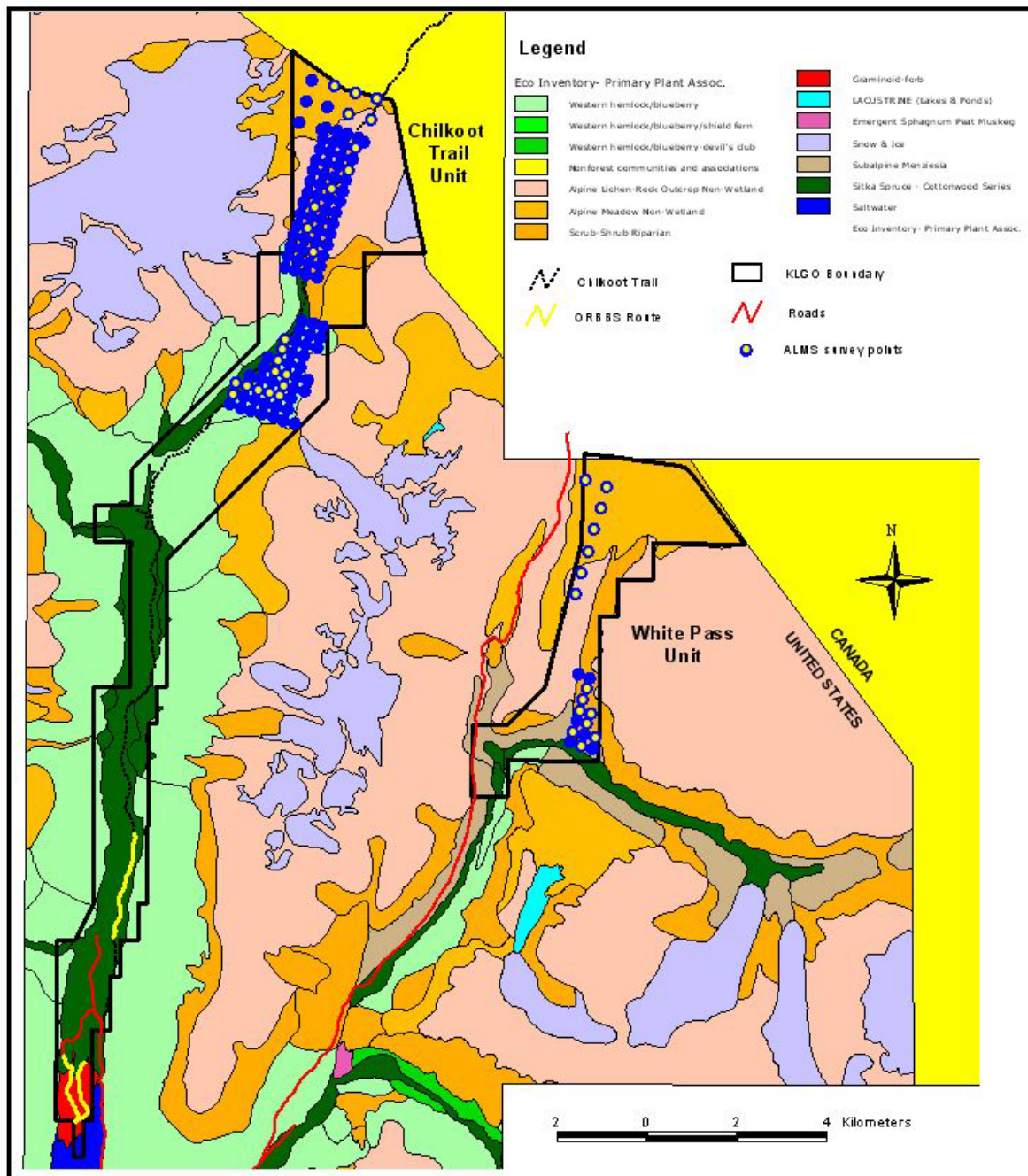


Figure 4. ORBBS routes (24 points) and ALMS points (28 points) surveyed in the 2003 KLGO Breeding Landbird Inventory (total number of points surveyed = 52).

Sampling design is described in detail in Appendix A (Handel 2003a). Survey methods are described in the ALMS Protocol (Handel 2003b). In addition to providing KLGO with the inventory protocol, Colleen Handel also created ArcView shapefiles for all of the survey routes. By adopting ALMS methodology for the KLGO inventory, we avoided the need to develop new data forms and databases for the collection and analysis of landbird survey data. Following the ALMS protocol also ensures the compatibility of KLGO monitoring efforts with the statewide monitoring system, thus permitting population trend analysis at multiple spatial scales with greater statistical power. All data were archived for analysis at the USGS Alaska Science Center in Anchorage. All original data forms were archived at KLGO.

Waterbirds

Waterbird migration surveys were conducted using methods similar to those described by Cain *et al.* (1988) for bird surveys in the Mendenhall wetlands in Juneau, Alaska. Areas of coastline that were visible from public access points between Skagway and the Taiya River delta were divided into eight census units and surveyed once per week in late April and May and bi-weekly during late summer and fall (August – mid September) (Figure 5). Surveys were conducted as weather and scheduling permitted and dates/time were not selected at random. Standardized observation points were established for each census unit to ensure the most complete coverage of the study area, and to minimize observer bias.

Observers counted and identified all birds visible within each unit and documented birds opportunistically observed while moving between units. Counts were made by scanning the census units with Bushnell Legend 10 x 42 binoculars and a Bausch & Lomb 20-60 x 70 spotting scope until the observer was able to quantify all visible birds in the unit. Surveys were only conducted under optimal weather conditions; however, occasionally conditions deteriorated during the course of a survey making species identification difficult (especially in the case of low clouds, fog and wind). Data were recorded on standardized data forms developed after Collins *et al.* (2001) (Appendix B). ArcView shapefiles of the observation points and census units were created for use in the park's GIS. All data, original data forms, and field notes were archived at KLGO.

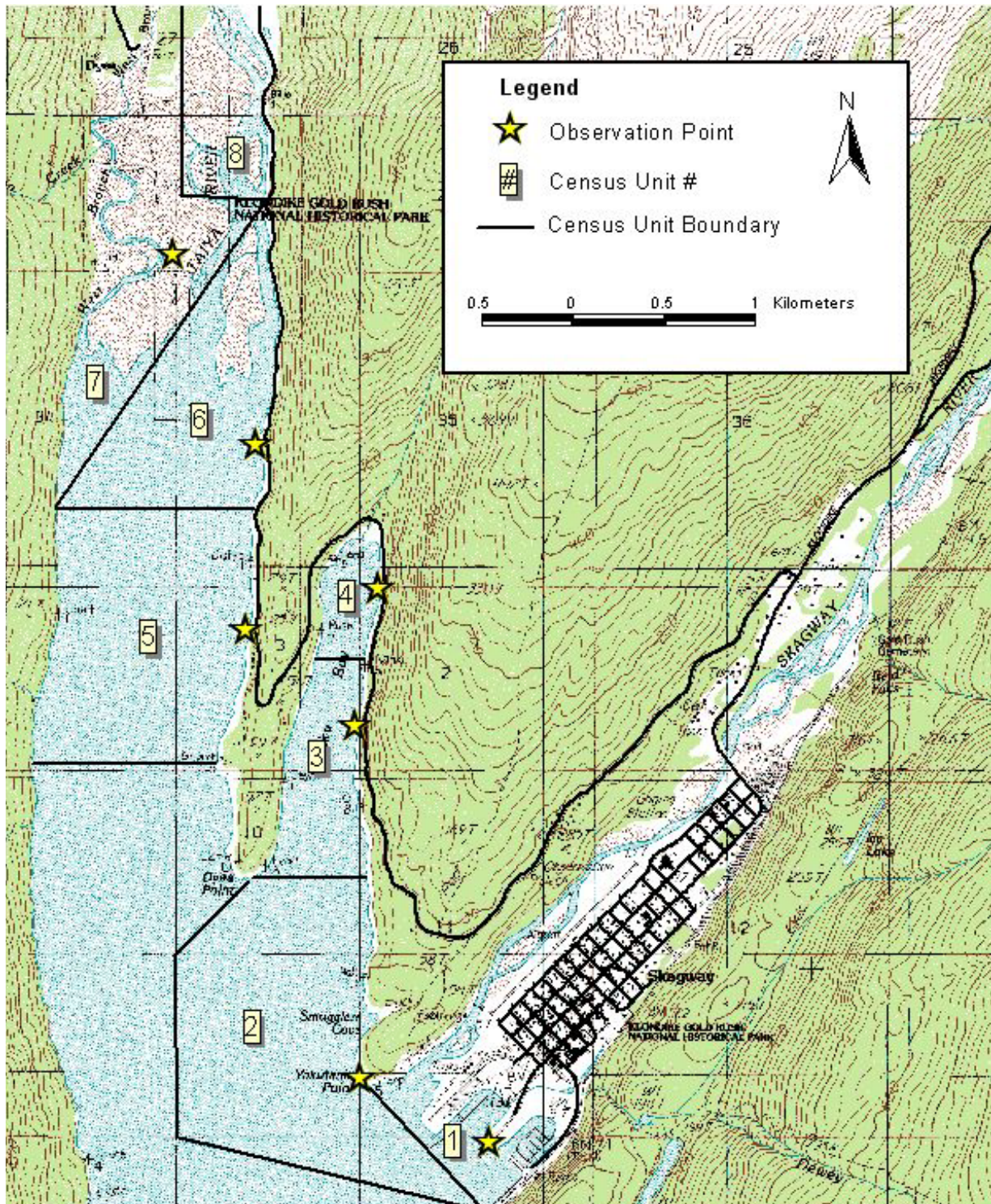


Figure 5. Census units surveyed for the Klondike Gold Rush NHP 2003 waterbird inventory in the upper Taiya Inlet (n=8).

Results

Survey Conditions

The spring of 2003 was unusually warm throughout the state, especially the month of April which saw weekly temperatures 2 to 6 degrees C above normal. Skagway had four consecutive daily record maxima in late April including a record setting high of 24 degrees C on Saturday 26 April 2003 (USDA 2003). Monthly weather summaries are available for Skagway, Alaska for April – July 2003 (NOAA 2004): temperatures in April were above normal (average temp. 6.2 degrees C), and total monthly precipitation was 46% of normal; May temperatures were near normal (average temp. 9.1 degrees C), and total monthly precipitation was 87% of normal; June temperatures were near normal (average temp. 12.9 degrees C), and total monthly precipitation was 250% of normal; July temperatures were above normal (average temp. 15.2 degrees C) and precipitation was 145% of normal.



Figure 6. Biological Science Technician Todd Trapp surveying waterbirds at the mouth of the Taiya River.

Breeding Landbirds

Surveys were conducted from 10 June to 1 July 2003, with the higher elevation routes (Chilkoot Alpine and White Pass Alpine) occurring later in the survey period. Routes and survey points were located in the field 1-2 days prior to conducting the surveys in order to ensure efficiency on the day of the actual survey. Due to the need to complete all breeding bird surveys during the optimal

time period (5 June to 30 June) habitat data were collected after all routes were surveyed (but as soon as possible to ensure that habitat components had not changed significantly between site visits). Habitats were surveyed between 8 July and 1 August 2003.

Two two-person field crews surveyed six of the seven survey routes. One member of each crew had considerable experience (more than eight field seasons) conducting point counts in Alaska using similar methodology. The two established ORBBS routes consisting of 24 survey points were surveyed by USFWS biologist Deb Rudis who has monitored these routes since 1999. These two routes have now been incorporated into the ALMS for the park. Natural Resources Program technicians surveyed an additional 28 points throughout the park, although five points on one route could not be surveyed for birds due to poor weather conditions. The inventory protocol called for the addition of 36-38 points, but 9-10 points could not be established in 2003 because of difficult access.

Six of the park's seven primary plant associations were sampled, and survey points ranged from sea level to 1,200 m (4,000 feet) elevation. Due to continuous fog and rain, the Chilkoot Alpine route was not surveyed for birds, but survey points were located and habitats documented. This route is relatively remote and requires two-three days of arduous backpacking along the Chilkoot Trail to access. Thick fog and rain are normal weather conditions in the Chilkoot Pass area during June, making it difficult to plan and implement the ALMS in this area. Our field crew spent several days in the Canadian warden's cabin at the Chilkoot Pass summit waiting for the weather to break, but consistently encountered extremely poor survey conditions. They were able to return to the area in mid-July to collect habitat information, systematically search the alpine habitat for birds, and document breeding activity around Chilkoot Pass. The Chilkoot Alpine route traverses two habitat types: alpine meadow non-wetland and alpine lichen-rock. Fortunately, these two habitat types were sampled on the White Pass Alpine survey when weather conditions were more favorable and access much easier.

The White Pass Low survey route was neither surveyed nor established due to extremely steep slopes, difficult access, inaccurate base vegetation maps and excessive stream noise at many potential point locations. The survey crew attempted to establish and survey this route in early June, but found the survey area virtually impossible to survey using the established protocol. Consequently, the subalpine – menziesia (*Menziesia ferruginea*) habitat type was not sampled during the inventory. We detected a total of 56 species of birds during 47 point surveys (Table 1). Of the 56 species detected, two are new species records for KLGO – merlin (*Falco columbarius*) and American three-toed woodpecker (*Picoides dorsalis*).

Table 1. Bird species observed during 2003 KLGO breeding landbird inventory (n = 56).

Family Anatidae Green-winged Teal Common Merganser	Family Tyrannidae Hammond's Flycatcher Pacific-slope Flycatcher	Family Turdidae Swainson's Thrush Hermit Thrush American Robin Varied Thrush
Family Accipitridae Bald Eagle Red-tailed Hawk	Family Vireonidae Warbling Vireo	Family Motacillidae American Pipit
Family Falconidae Merlin	Family Corvidae Steller's Jay Northwestern Crow Common Raven	Family Parulidae Orange-crowned Warbler Yellow Warbler Myrtle Warbler Townsend's Warbler Blackpoll Warbler American Redstart Northern Waterthrush Wilson's Warbler
Family Phasianidae Willow Ptarmigan Rock Ptarmigan White-tailed Ptarmigan Blue Grouse	Family Hirundinidae Violet-green Swallow	
Family Scolopacidae Lesser Yellowlegs Wandering Tattler	Family Paridae Black-capped Chickadee Chestnut-backed Chickadee	Family Thraupidae Western Tanager
Family Laridae Herring Gull Glaucous-winged Gull	Family Sittidae Red-breasted Nuthatch	Family Emberizidae American Tree Sparrow Chipping Sparrow Savannah Sparrow Fox Sparrow Lincoln's Sparrow Golden-crowned Sparrow Dark-eyed Junco Snow Bunting
Family Trochilidae Rufous Hummingbird	Family Certhiidae Brown Creeper	
Family Alcedinidae Belted Kingfisher	Family Troglodytidae Winter Wren	
Family Picidae Red-breasted Sapsucker Am. Three-toed Woodpecker	Family Cinclidae American Dipper	
	Family Regulidae Golden-crowned Kinglet Ruby-crowned Kinglet	Family Fringillidae Gray-crowned Rosy-Finch Pine Siskin

Waterbirds

Waterbird surveys were conducted in the upper Taiya Inlet between 24 April and 17 September 2003 (n=20) (Figure 6). Thirty-nine waterbird species and bald eagles (nine families + bald eagle) were observed during waterbird counts (Table 2). The most abundant species were horned grebe (*Podiceps auritus*), red-necked grebe (*P. grisegena*), mallard (*Anas platyrhynchos*), surf scoter (*Melanitta perspicillata*), red-breasted merganser (*Mergus serrator*), Bonaparte's gull (*Larus philadelphia*), marbled murrelet (*Brachyramphus marmoratus*), mew gull (*L. canus*) and herring gull (*L. argentatus*) as well as bald eagle. The status of three expected waterbird species was confirmed: trumpeter swan (*Cygnus buccinator*), canvasback (*Aythya valisineria*), and semipalmated

sandpiper (*Calidris pusilla*). Three species were observed that were not on the park's expected species list: Pacific loon (*Gavia pacifica*), dunlin (*Calidris alpina*) and pigeon guillemot (*Cepphus columba*).

Table 2. Bird species observed during the 2003 KLGO upper Taiya Inlet waterbird inventory (n = 40).

Family Gaviidae Pacific Loon Common Loon <i>Unidentified Loon</i>	Family Anatidae (Continued) Greater Scaup <i>Unidentified Scaup</i> Harlequin Duck Surf Scoter White-winged Scoter Bufflehead Common Goldeneye Barrow's Goldeneye Common Merganser Red-breasted Merganser	Family Scolopacidae Greater Yellowlegs Lesser Yellowlegs Wandering Tattler Spotted Sandpiper Semipalmated Sandpiper Least Sandpiper Dunlin <i>Unidentified Sandpiper</i> <i>Unidentified Shorebird</i>
Family Podicipedidae Horned Grebe Red-necked Grebe		
Family Ardeidae Great Blue Heron		
Family Anatidae Trumpeter Swan American Wigeon Mallard Blue-winged Teal Northern Shoveler Northern Pintail Green-winged Teal Canvasback Ring-necked Duck	Family Accipitridae Bald Eagle Family Charadriidae Semipalmated Plover Killdeer	Family Laridae Bonaparte's Gull Mew Gull Herring Gull Glaucous-winged Gull Arctic Tern Family Alcidae Pigeon Guillemot Marbled Murrelet

Incidental Observations

Incidental observations by NPS biologists and Skagway Bird Club members added 13 new species to the park's bird list: northern saw-whet owl (*Aegolius acadicus*), boreal owl (*Aegolius funereus*), Eurasian wigeon (*Anas penelope*), northern hawk owl (*Surnia ulula*), fork-tailed storm-petrel (*Oceanodroma furcata*), Glaucus gull (*Larus hyperboreus*), Thayer's gull (*Larus thayeri*), American coot (*Fulica americana*), alder flycatcher (*Empidonax alnorum*), European starling (*Sturnus vulgaris*), gray jay (*Perisoreus canadensis*), Tennessee warbler (*Vermivora peregrina*), and American goldfinch (*Carduelis tristis*). Only four species were on the park's expected species list prior to this study: gray jay, European starling, alder flycatcher, and Tennessee warbler.

Summary Results

The breeding landbird and waterbird inventory efforts resulted in 21 new bird species records for KLGO:

Amer. Three-toed Woodpecker	Eurasian Wigeon	Northern Saw-whet Owl
Trumpeter Swan	Dunlin	Boreal Owl
Semipalmated Sandpiper	Glaucus Gull	Northern Hawk Owl
Pigeon Guillemot	Pacific Loon	Tennessee Warbler
Fork-tailed Storm-Petrel	Canvasback	Alder Flycatcher
Merlin	Thayer's Gull	American Goldfinch
European Starling	American Coot	Gray Jay

Of those 21 new species, six were documented during waterbird surveys; two during breeding landbird point count surveys, and 13 were incidental observations by NPS staff and experienced local birders. Over half of the new species (n=12) were not on the park's expected species list. A final tally of the newly documented and remaining undocumented species reveals that we were able to confirm the occurrence of 91% of the species of waterbirds and breeding landbirds expected to occur in the park (Table 3). A complete list of KLGO's expected and documented bird species is included in Appendix C.

Table 3. Summary of documented and expected bird species in KLGO.

Year	# Documented	# Expected	% Documented
2001	137	162	85
2004	158	174	91

Discussion

The purpose of baseline biological inventories and long-term monitoring is to provide park managers with timely information that facilitates land management planning, helps track wildlife population and ecosystem change over time, and keeps resource managers apprised of changes that may require action before a crisis occurs. One of the goals of the National Park Service is to maintain intact ecosystems in their natural state, so as to provide for biological refugia. Birds in general contribute significantly to the biological diversity of parks and are sensitive to ecosystem change (Oakley *et al.* 2004). Continentally, many landbird populations have suffered dramatic declines over the last half century due to loss of habitat, habitat fragmentation, increased predation, invasive species, contaminants, and over-exploitation (Martin and Finch 1995).

The BPIF assessed the status of Alaska's landbird fauna within the five state Biogeographic Regions and concluded that the most important breeding landbird habitats were low-elevation coniferous – mixed coniferous/deciduous forests, and riparian broadleaf/deciduous forests and shrublands. These habitats are important because they support a disproportionately higher abundance and diversity of breeding landbirds and long-distance migrants (BPIF 1999). Likewise, many shorebird species and habitats have been identified as being of high conservation concern (Brown *et al.* 2001). The park contains excellent breeding and migration habitat for landbirds and waterbirds, most notably the Taiya River riparian Sitka spruce-cottonwood forests and the Taiya River estuary.

We recommend that bird species distributions, habitat associations, and abundances continue to be monitored in the park's regionally and internationally important bird habitats, and that KLGO continue to contribute to the ALMS effort. The park should formalize a waterbird migration monitoring protocol for the Taiya River estuary and seek assistance from local area birders to expand this effort beyond the park boundary in order to encompass more of the upper Taiya Inlet. Many of the undocumented bird species on the park's expected species list are waterbirds, most notably shorebirds. Monitoring of spring waterbird migration, especially during the brief period when shorebirds are present, is highly recommended. Adding additional bird species to the park's list will be difficult because the remaining undocumented species are apparently uncommon, may occur in low numbers, or appear irregularly or accidentally in the park. It might prove useful to reevaluate the expected species list for the park in light of the new information gained from this inventory effort.

There are no federally listed Threatened or Endangered bird species in KLGO; however, nine Alaska WatchList species have been documented in the park (Table 4). The WatchList identifies at-risk Alaskan bird populations that may be facing population decline, limited geographic range, habitat loss and other threats but are not already protected under the federal Endangered Species Act.

Table 4. Alaska WatchList bird species present in KLGO (Audubon 2004). B = occurs in region as a breeding species; N = occurs in region as non-breeder (e.g., migrating or wintering species)

Species	Breeding Status	Conservation Concerns
Red-throated Loon <i>Gavia stellata</i>	BN	Vulnerable to oil spills
Long-tailed Duck <i>Clangula hyemalis</i>	N	Contaminants & oil spills
Golden Eagle <i>Aquila chrysaetos</i>	B	Wintering habitat loss in N. Rockies & Great Plains
Peregrine Falcon <i>Falco peregrinus</i>	BN	Contaminants
Wandering Tattler <i>Heteroscelus incanus</i>	B	Population declines, small population size
Dunlin <i>Calidris alpina articola</i>	N	Loss of wetlands, decline in breeding
Marbled Murrelet <i>Brachyramphus marmoratus</i>	BN	Loss of breeding habitat (old-growth forests)
Olive-sided Flycatcher <i>Contopus cooperi cooperi</i>	B	Loss of wintering/breeding habitat
Blackpoll Warbler <i>Dendroica striata</i>	B	Broad population declines

Investigations into the breeding ecology, phenology, reproductive success, and population age structure of KLGO breeding birds would also yield valuable information on the status of these species, especially those identified on the Alaska WatchList. We intend to use the results of these inventories to create a revised bird checklist and an atlas database for the Taiya and Skagway River watersheds in collaboration with the Skagway Bird Club. The forth coming Vital Signs Monitoring Program will be a great opportunity for KLGO natural resource managers to review the park's nascent landbird inventory and monitoring program and determine its future direction.

Acknowledgements

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Special thanks, as well, go to the newly formed Skagway Bird Club, especially club founder John McDermott, co-founder Elaine Furbish, Andrew and Joanne Beierly, Terry Miller, and Jeremy Simmons. Many Skagway Bird Club members contributed observations of previously undocumented bird species, and were ideal partners in the preparation of an updated bird checklist for the upper Taiya Inlet. Likewise, Yukon Bird Club members, most notably Cameron Eckert and Helmut Grunberg, gladly shared with us their considerable knowledge of Skagway birds. The contribution of these avid birders and their knowledge of landbird and waterbird distributions and abundances in Southeast Alaska and the Yukon cannot be overstated.

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APPENDIX A.

Recommendations for Inventory and Monitoring of Breeding Bird Populations in Klondike Gold Rush National Historic Park

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PLACEMENT OF SURVEY ROUTES

Seven primary plant associations have been mapped within boundaries of the Chilkoot and White Pass units of the Klondike Gold Rush National Historic Park. The park is very linear in nature, crossing a strong elevational and thus ecological gradient. The inventory effort for breeding birds should optimally be allocated so that survey points are distributed across the elevational gradient and within the various plant associations that have been mapped. Existing trails, the highway, and the railroad system can provide access to much of the park.

There are two established survey routes within the Park that have been surveyed for several years, beginning in 1995. The Dyea route (#818) covers the southern-most portion of the Park, near the mouth of the Taiya River. This route consists of 12 survey points, which adequately cover the graminoid-forb meadows mapped for the Park. The Lower Chilkoot Trail route (#817) consists of 12 points along the Chilkoot Trail beginning about 4.5 km above the trailhead. This route is entirely at low elevation (< 20 m above sea level), and encompasses Sitka spruce-cottonwood riparian forest. These two routes can be used to characterize the breeding bird communities of the low-elevation areas of the Park.

I recommend that four additional survey routes be established: one at mid-elevation along the Chilkoot Trail, one at high elevation near Chilkoot Pass, and two short routes within the White Pass unit. The mid-elevation Chilkoot Trail route would sample the corridor between Pleasant Camp and the original Sheep Camp. This route would sample the following plant associations: western hemlock-blueberry and Sitka spruce-cottonwood riparian. The Chilkoot Pass route would sample from Sheep Camp to the Pass and would include scrub-shrub riparian, alpine meadow, and alpine lichen-rock outcrop habitat. Both of these routes could be surveyed using Sheep Camp as a base camping site; each would require one morning to survey. The Lower White Pass route would be accessed from the railroad flagstop and would sample subalpine menziesia, Sitka spruce-cottonwood riparian, and scrub-shrub riparian. The Upper White Pass route would be accessed by hiking in from the highway and would sample alpine meadow and alpine lichen-rock outcrop habitat. Because of the different routes of access, the two White Pass routes would probably each require a morning to complete.

APPENDIX A (cont.)

I recommend surveying an additional 36-38 points within the Park, which would give a total of 60-62 points including the two established routes. I would allocate 7-8 to lower White Pass, 7 to upper White Pass, 12 to mid-elevation Chilkoot Trail, and 10-11 to high-elevation Chilkoot Pass. Allocations among habitat types are based on a combination of area within the Park, safe access, and expected density and diversity of bird species (see Table 1). Allocations to graminoid-forb meadows and scrub-shrub riparian habitats are relatively higher because the number of species and densities of birds are expected to be higher than in other habitats. Allocations to alpine lichen-rock are relatively lower because densities are expected to be lower and safe access is a concern.

Table 1. Suggested allocation of breeding bird survey points per route and habitat type.

Habitat	Dyea	Lower Chilkoot Trail	Mid-Chilkoot Trail	Chilkoot Pass	Lower White Pass	Upper White Pass
Graminoid forb meadow	10					
Sitka spruce-cottonwood	2	12	5		1	
W. hemlock-blueberry			7			
Scrub-shrub riparian				5-6	4-5	
Subalpine menziesia					2	
Alpine meadow non-wetland				3		5
Alpine lichen-rock				2		2

SELECTION OF SAMPLE POINTS

I have provided several ArcView shape files (Table 2) that show randomly placed grids in each of these areas; these can be used to choose sampling points for each route. Note that all latitude-longitude coordinates are given using the NAD27 datum. The grids at the highest elevations have 500-m spacing between points; lower elevation grids have 250-m spacing. Selection of exact points will need to be done in the field to assure that (1) points can be accessed safely, (2) points are far enough apart so that there are few duplicate detections of individual birds between adjacent points, and (3) each route can be completed within a single morning (within 4-5 hr of sunrise). For each area except Upper White Pass, I have provided a grid with a large number of alternate points and two potential routes that could be selected. If either of these routes works for an area, use it. If there are safety hazards or spacing problems with these, choose an alternate route from

APPENDIX A (cont.)

the sample grid. Use the table above to determine how many points to place in each habitat type. In Chilkoot Pass and Lower White Pass I have bracketed how many points should be surveyed in scrub-shrub riparian habitat. Only use the higher number if the route can be completed reasonably within a morning period. This will depend on how far apart the points must be and how difficult the terrain is to traverse.

Table 2. ArcView shapefiles with locations of potential sample points by route.

File name	# points	Description
Chilkoot_alpine_all	12	Chilkoot Pass; entire sample grid for alpine
Chilkoot_alpine1	5	Chilkoot Pass; potential route 1 for alpine
Chilkoot_alpine2	5	Chilkoot Pass; potential route 2 for alpine
Chilkoot_shrub_all	56	Chilkoot Pass; entire grid for subalpine
Chilkoot_shrub1	6	Chilkoot Pass; potential route 1 for subalpine
Chilkoot_shrub2	6	Chilkoot Pass; potential route 2 for subalpine
Chilkoot_mid_all	47	Mid-Chilkoot Trail; entire sample grid
Chilkoot_mid1	12	Mid-Chilkoot Trail; potential route 1
Chilkoot_mid2	12	Mid-Chilkoot Trail; potential route 2
Whpa_alpine	7	Upper White Pass route (only option given)
Whpa_low_all	14	Lower White Pass; entire sample grid
Whpa_low1	8	Lower White Pass; potential route 1
Whpa_low2	8	Lower White Pass; potential route 2

RECOMMENDED SURVEY METHODS

Survey methods should follow those established for the Alaska Landbird Monitoring System (ALMS). Accompanying documents provide detailed protocols and data forms. Surveys consist of variable circular point counts of 10-min duration, with presence of additional species recorded while traversing between points. Optimal survey dates will be between 5 and 15 June for the lower elevation routes and 15-25 June for the upper elevation routes. Standardized ALMS protocols should also be followed for collecting habitat data at each point.

Bird surveys in past years at Dyea and Lower Chilkoot Trail used slightly different protocol (5-min counts and single distance band of 50 m). The new protocol should be followed for all routes; the new design will allow direct comparison with earlier years' data.

APPENDIX A (cont.)

Surveys in the first year will provide an initial inventory of breeding birds in the Park by habitat. These surveys can be repeated in subsequent years to monitor bird populations. The ALMS protocol designates biennial surveys, with half being completed in alternate years. For the Park, the scheme could be to monitor Dyea, Mid-Chilkoot Trail, and Chilkoot Pass in year 1 and Lower Chilkoot Trail, Lower White Pass, and Upper White Pass in year 2.

ANALYSIS OF DATA

Data collected according to the ALMS protocol will be archived and analyzed at the USGS Alaska Science Center. Data will be compatible with the statewide monitoring system, which will allow analysis at local, regional, and statewide levels. Instructions for submitting data can be found in the ALMS protocol.

APPENDIX B.

UPPER TAIYA INLET WATERBIRD SURVEY – Point Descriptions and Data Forms

CENSUS UNIT #1

Skagway Harbor Area and River Mouth.--Start the survey by walking from the Harbor Master's office down the harbor access ramp to the docks. Continue walking along the east dock to the end looking down each slip sequentially (make sure to look for gulls on the tops of poles). Turn right and continue to the end of the south dock to the harbor entrance. From there, turn around and walk back and up the south ramp and out onto the harbor breakwall to near the end. Scan the outer harbor area to just beyond the east ship dock where the shoreline curves inward and disappears from view (make sure to look for waterfowl beneath the dock amongst the pilings).

When finished, walk back along Congress Way around the harbor to the State Ferry Terminal parking lot. From there, walk around the north end of the ship harbor scanning beneath the pilings and then back along the west sidewalk south to the northwest corner of the Ferry Terminal. Scan the rest of the outer harbor area out parallel to Yakutania Point. Then, take a quick walk around the Terminal out onto the Ferry dock.

Next, walk back up Broadway and take the sidewalk along the railroad tracks northwest to the Skagway River foot bridge that goes to Yakutania Point. Survey up river to the end of the airport runway and downstream to the mouth (look for shorebirds on the east side of the river below Temsco Helicopters where there is a small tidal wetland area). Continue walking across the foot bridge and down the foot path toward Yakutania Point. Where the path turns right to go to Yakutania Point, continue straight ahead out onto the rocky point on the west side of the river. This gives a good view of the river mouth and the small beach area to the north. This completes this section of the survey.

CENSUS UNIT #2

Yakutania Point.--Walk out onto the end of Yakutania Point and survey the area in a line out to just beyond the end of the east ship dock where the shoreline curves inward and is not visible from the harbor area in a triangle approximately 1.6 km southwest of Yakutania Point. Continue scanning out 1.6 km west of the point in an arc to Dyea Point and across the mouth of Nahku Bay.

After surveying this section, walk across the gravel beach immediately to the north of Yakutania Point and up onto the large rock outcrop. From the top of the rock outcrop, survey the rest of the shoreline and small cove not visible from the point. This completes this section of the survey.

APPENDIX B (cont.)

CENSUS UNIT #3

Outer Nahku Bay.--The observation point for this section is at the northern end of the large pullout at Mile 5. There is a rock promontory on the other side of the guard rail that provides a good overlook. Survey the outer two-thirds of the bay beginning at the entrance to the bay demarcated by Dyea Point to the large rock outcrop on the west shore directly below the black house on the ridge above. Survey the outer bay to the point where the outcrop breaks the small bench along the shore.

CENSUS UNIT #4

Inner Nahku Bay.--The observation point for this section is at the last little pullout on the west side of the road (actually just a small widening of the road) before the beach. Survey the inner one-third of the bay beginning at the large rock outcrop on the west shore directly below the black house on the ridge above.

CENSUS UNIT #5

Upper Taiya Inlet.--This section is best surveyed when the water is calm and glassy as many waterbirds prefer the west shore. It is also best to survey this section at low tide when the birds are concentrated.

Begin by parking at the small pullout next to a rock promontory on the west side of the road at Mile 7. Walk south along the road approximately 30m to the side road on the west. Walk down the side road a short distance to a gate and then walk out to the edge of the ridge along the Inlet. Follow the ridge south about 20m to a large open rock outcrop with the remains of a large old wooden tripod probably used as a boom or hoist of some kind. This is the primary observation point for this section. Begin the survey from an east-west line directly across from the southernmost visible point on the east shore (i.e., the next point north of Dyea Point). Survey the upper Inlet to an east-west line directly across from the derelict trespass cabin. This point is roughly demarcated by a rock outcrop on the west shore where a section of rock has fallen away revealing reddish-toned rock beneath.

Survey the east shore that is not visible from the tripod for this section from the rock promontory at the parking pullout. This completes this section of the survey.

CENSUS UNIT #6

Taiya River Mouth.--Just north of the derelict trespass cabin there is a large pullout on the east side of the road at a utility pole. Directly kiddy-corner from this pullout there is a small pullout (actually just a small widening of the road) on the west side of the road approximately 30m north. Park here and walk down a fairly steep embankment to the shoreline. There is a large flat rock exposed during low tide just to the south that provides a good vantage point of the upper Inlet. The

APPENDIX B (cont.)

observer may also pick another suitable vantage point if the rock slab is not accessible. Survey the triangle formed by a northeast line beginning on the west shore directly across from the trespass cabin demarcated by a rock outcrop on the west shore where a section of rock has fallen away revealing reddish-toned rock beneath to the southwest corner of the Taiya River mouth. This observation point gives a good view of the head of the Inlet.

Drive north along the Inlet from the pullout looking for birds along the shoreline below that was not visible from the last observation point. Continue past a large pullout on the west side of the road above the mouth of the river to several small pullouts (actually just small widenings of the road) on the west past the last shrubs that block the view. Survey the mouth of the river from here. The determination of the mouth of the river will depend on the tide. The end of this section is upstream to the point where the river starts to curve to the west in a large S-curve and a vegetated cut-bank begins on the west bank. Toward the end of the S-curve, a higher-benched cut-bank begins.

CENSUS UNIT #7

Nelson Creek Mouth and Taiya Flats.--Drive along the dirt road out onto the flats and park at the point where the road goes alongside Nelson Creek at a bend in the creek just before the end of the road. From here, walk along the east side of the creek to its mouth surveying the creek as well as the flats. Survey the triangle at the head of the Inlet formed by a line beginning at a rock outcrop on the west shore where a section of rock has fallen away revealing reddish-toned rock beneath directly across from the derelict trespass cabin on the eastern shore to the southwest corner of the Taiya River mouth. If the upper Inlet was surveyed at low tide, most birds except dabblers near the creek mouth will have been counted. Continue walking the shoreline east of the creek mouth along the beach dunes in a wide circle back to the parking area. Dabbling ducks in this section will be flighty, so it is best to get counts from a distance before birds are flushed. This completes this section.

CENSUS UNIT #8

Taiya River.--Survey from where a large S-curve begins as described above in the section Taiya River Mouth. This section ends at the farthest point upstream visible from the Chilkoot Trailhead at the Taiya River Bridge. Note birds as being either below or above the bridge.

Survey Notes.--The Skagway harbor and River mouth, and Yakutania Point can be surveyed in 3-4 hours. It is best to survey this area very early in the morning before cruise ship passenger, boat, and helicopter traffic picks-up.

APPENDIX B (cont.)

Nahku Bay, upper Taiya Inlet, Taiya River, Nelson Creek, and Taiya Flats can be surveyed in 6-8 hours depending on the number of birds present. It is essential that the upper Inlet, Taiya River, Nelson Creek, and Taiya Flats be surveyed on the same day. It is best to start surveying the upper Inlet on a low tide when birds are concentrated. The ideal time would be three hours before low tide. These surveys are best conducted on sunny calm days when visibility is best. Winds tend to pick up mid to late morning, so start early. It is very easy to see and count birds, especially small species such as Marbled Murrelets or distant birds when the water is glassy calm and before the air heats up.

APPENDIX B (cont.)

UPPER TAIYA INLET WATERBIRD SURVEY DATA FORM

Location _____

Date

Month
<input type="text"/>

 /

Day
<input type="text"/>

 /

Year
<input type="text"/>

 Start Time

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

 (24 hours)
End Time

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------	----------------------

 (24 hours) Temp

<input type="text"/>	<input type="text"/>
----------------------	----------------------

 °C

Wind: 0 1 2 3 4 Cloud: 0 1 2 3 Precip: 0 1 2 3 4 5 6 7 8 9 10

WDir

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

 ° Visibility

<input type="text"/>	<input type="text"/>
----------------------	----------------------

 km or UNLV Wave Height: 0 1 2 3 4 5 W or S

Species	Breeding Codes	Observations (Counts of individuals, pairs, and groups)

Species	Breeding Codes	Observations (Counts of individuals, pairs, and groups)

Notes/Comments:

APPENDIX B (cont.)

WIND SPEED CODES: (Enter Beaufort numbers, not m.p.h.)

Beaufort Number	Wind Speed (miles/hour)	Indicators of Wind Speed
0	Less than 1	Air calm; smoke rises vertically.
1	1 to 3	Direction of wind shown by smoke drift but not by wind vanes.
2	4 to 7	Wind felt on face; leaves rustle; wind vanes moved by wind.
3	8 to 12	Leaves and small twigs in constant motion; wind extends light flag.
4	13 to 18	Raises dust, loose paper; small branches are moved.
5	19 to 24	Small trees in leaf begin to sway; crested wavelets form on inland waters.

CLOUD COVER CODES:

0	<i>Clear</i> , less than 10 percent cloud cover.
1	<i>Scattered</i> , 10-50 percent cloud cover.
2	<i>Broken</i> , 50-90 percent cloud cover.
3	<i>Overcast</i> , more than 90 percent cloud cover over entire sky.

PRECIPITATION CODES:

0	<i>None.</i>	7	<i>Sleet.</i>
1	<i>Fog.</i>	8	<i>Light snow.</i>
2	<i>Drizzle.</i>	9	<i>Moderate snow.</i>
3	<i>Showers</i> (intermittent rain).		
4	<i>Light rain.</i>	10	<i>Heavy snow.</i>
5	<i>Moderate (steady) rain.</i>		
6	<i>Heavy rain.</i>		

WAVE/SWELL HEIGHT CODES: (Circle W or S)

0	<i>Calm</i> , sea surface smooth and mirror-like.
1	<i>0.1 m</i> , scaly ripples, no foam crests.
2	<i>0.1-0.5 m</i> , small wavelets, crests glassy, no breaking.

APPENDIX B (cont.)

- 3 0.5-1.0 m, large wavelets, crests begin to break, scattered whitecaps.
- 4 1.0-1.5 m, small waves, becoming longer, numerous whitecaps.
- 5 1.5-2.0 m, moderate waves, taking longer form, many whitecaps, some spray.

BREEDING CRITERIA CODES:

Code¹ — Evidence

OBSERVED:

O—Species (male or female) **observed** in a block during its breeding season, but no evidence of breeding. Not in suitable nesting habitat. Includes wide ranging species such as vultures or raptors, or a colonial nesting species not at the nesting colony.

POSSIBLE:

X—Species (male or female) observed in suitable nesting habitat during its breeding season.

XS—Singing/drumming/booming male present in suitable nesting habitat during its breeding season.

XT—Multiple singing males of a species, evenly spaced in suitable nesting habitat during their breeding season.

PROBABLE:

P—**Pair** observed in suitable habitat during its breeding season.

S—Permanent territory presumed through **song** at same location on at least two occasions 7 days or more apart.

T—Permanent **territory** presumed through defense of territory (chasing individuals of the same species).

C—**Courtship** behavior or **copulation**.

N—Visiting probable **nest-site**.

A—**Agitated** behavior or anxiety calls from adult.

B—Nest **building** by wrens or excavation of holes by woodpeckers.

CONFIRMED:

CN—**Carrying nesting** material, such as sticks or other material. Please submit full details including location within the block of the observation.

NB—**Nest building** at the actual nest-site.

PE—**Physiological evidence** of breeding (e.g. highly vascularized, edematous incubation [brood] patch or egg in oviduct based on bird in hand. To be used by experienced bird banders on local birds during the nesting season).

DD—**Distraction display** or injury feigning.

UN—**Used nests** or eggshells found. Caution: these must be carefully identified, if they are to be accepted.

PY—**Precocial young**. Flightless young of precocial species restricted to the natal area by dependence on adults or limited ability.

FL—Recently **fledged** young (either precocial or altricial) incapable of sustained flight, restricted to natal area by dependence on adults or limited mobility.

ON—**Occupied nest**: adults entering or leaving a nest site in circumstances indicating occupied nest. To be used for nests which are too high (eg the tops of trees) or enclosed (eg chimneys) for the contents to be seen.

CF—**Carrying food**: adult carrying food for the young.

FY—Adult feeding recently **fledged** young.

FS—Adult carrying fecal **sac**.

NE—**Nest** with **egg(s)**.²

NY—**Nest** with young **seen** or **heard**.²

Notes:

1. The **letter code** is entered by the field workers in the appropriate space on the field report form. **Possible** and **Probable** categories are represented by single letters or a symbol. **Confirmed** by double letters. Letters have been selected as a mnemonic aid, keyed to bolded words in criteria definitions.

2. Presence of cowbird eggs or young is confirmation of both cowbird and host species.

APPENDIX C.

Bird species list for Klondike Gold Rush National Historical Park. New species confirmed in 2003 appear in bold (n=21).

* = new species documented in 2003 that were on KLGO's expected species list (n=9)

** = new species documented in 2003 that were not on the expected species list (n=12)

<p>Order: Anseriformes Family: Anatidae</p>

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Anas acuta	northern pintail	Present in Park	Migratory
Anas americana	american wigeon	Present in Park	Migratory
Anas clypeata	northern shoveler	Present in Park	Migratory
Anas crecca	green-winged teal	Present in Park	Migratory
Anas discors	blue-winged teal	Present in Park	Vagrant
Anas penelope **	Eurasian wigeon	Present in Park	Migratory
Anas platyrhynchos	mallard	Present in Park	Resident
Anas strepera	gadwall	Present in Park	Migratory
Aythya affinis	lesser scaup	Present in Park	Migratory
Aythya americana	redhead	Probably Present	Vagrant
Aythya collaris	ring-necked duck	Present in Park	Migratory
Aythya marila	greater scaup	Present in Park	Migratory
Aythya valisineria *	canvasback	Present in Park	Migratory
Branta bernicla	brant	Probably Present	Vagrant
Branta canadensis	canada goose	Present in Park	Migratory
Bucephala albeola	bufflehead	Present in Park	Resident
Bucephala clangula	common goldeneye	Present in Park	Resident
Bucephala islandica	barrow's goldeneye	Present in Park	Resident
Chen caerulescens	snow goose	Probably Present	Migratory
Clangula hyemalis	long-tailed duck	Present in Park	Migratory
Cygnus buccinator *	trumpeter swan	Present in Park	Migratory
Cygnus columbianus	tundra swan	Present in Park	Migratory
Histrionicus histrionicus	harlequin duck	Present in Park	Resident
Melanitta fusca	white-winged scoter	Present in Park	Resident
Melanitta perspicillata	surf scoter	Present in Park	Resident
Mergus merganser	common merganser	Present in Park	Resident
Mergus serrator	red-breasted merganser	Present in Park	Resident

<p>Order: Apodiformes Family: Apodidae</p>
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Chaetura vauxi	vaux's swift	Probably Present	Vagrant

APPENDIX C (cont.)

Order: Ciconiiformes Family: Accipitridae
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<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Accipiter gentilis	northern goshawk	Present in Park	Resident
Accipiter striatus	sharp-shinned hawk	Present in Park	No data
Aquila chrysaetos	golden eagle	Present in Park	Vagrant
Buteo jamaicensis	red-tailed hawk	Present in Park	Vagrant
Circus cyaneus	northern harrier	Present in Park	Migratory
Haliaeetus leucocephalus	bald eagle	Present in Park	Resident

Order: Ciconiiformes Family: Ardeidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Ardea herodias	great blue heron	Present in Park	Resident

Order: Ciconiiformes Family: Charadriidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Charadrius semipalmatus	semipalmated plover	Present in Park	Migratory
Charadrius vociferus	killdeer	Present in Park	Migratory
Pluvialis dominica	American golden plover, lesser golden-plover	Present in Park	No data

Order: Ciconiiformes Family: Falconidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Falco columbarius *	merlin	Present in Park	No data
Falco peregrinus	peregrine falcon	Present in Park	Migratory
Falco rusticolus	gyrfalcon	Present in Park	Migratory
Falco sparverius	american kestrel	Present in Park	Migratory

Order: Ciconiiformes Family: Gaviidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Gavia immer	common loon	Present in Park	Resident
Gavia pacifica **	Pacific loon	Present in Park	Migratory
Gavia stellata	red-throated loon	Present in Park	Vagrant

APPENDIX C (cont.)

Order: Ciconiiformes Family: Laridae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Brachyramphus marmoratus	marbled murrelet	Present in Park	Resident
Cephus columba **	pigeon guillemot	Present in Park	Migratory
Larus argentatus	herring gull	Present in Park	Resident
Larus canus	mew gull	Present in Park	Resident
Larus glaucescens	glaucous-winged gull	Present in Park	Resident
Larus hyperboreus **	glaucus gull	Present in Park	Migratory
Larus philadelphia	bonaparte's gull	Present in Park	Migratory
Larus thayeri **	Thayer's gull	Present in Park	Migratory
Sterna paradisaea	arctic tern	Present in Park	Migratory

Order: Ciconiiformes Family: Phalacrocoracidae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Phalacrocorax auritus	double-crested cormorant	Probably Present	No data

Order: Ciconiiformes Family: Podicipedidae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Podiceps auritus	horned grebe	Present in Park	Migratory
Podiceps grisegena	red-necked grebe	Present in Park	Migratory

Order: Ciconiiformes Family: Scolopacidae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Actitis macularia	spotted sandpiper	Present in Park	Migratory
Calidris alba	sanderling	Present in Park	Vagrant
Calidris alpina **	dunlin	Present in Park	Migratory
Calidris mauri	western sandpiper	Present in Park	Migratory
Calidris melanotos	pectoral sandpiper	Present in Park	Migratory
Calidris minutilla	least sandpiper	Present in Park	No data
Calidris pusilla *	semipalmated sandpiper	Present in Park	No data
Capella gallinago	No info	False Report	Migratory
Gallinago gallinago	common snipe	Present in Park	Migratory
Heteroscelus incanus	wandering tattler	Present in Park	Migratory
Limnodromus griseus	short-billed dowitcher	Probably Present	No data
Limnodromus scolopaceus	long-billed dowitcher	Present in Park	Vagrant
Numenius phaeopus	whimbrel	Probably Present	No data
Phalaropus lobatus	red-necked phalarope	Present in Park	Migratory
Tringa flavipes	lesser yellowlegs	Present in Park	Migratory
Tringa melanoleuca	greater yellowlegs	Present in Park	Migratory
Tringa solitaria	solitary sandpiper	Present in Park	Migratory

APPENDIX C (cont.)

<div>Order: Coraciiformes Family: Cerylidae</div>			
<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Ceryle alcyon	belted kingfisher	Present in Park	Resident
Megaceryle alcyon	No info	False Report	No data
<div>Order: Galliformes Family: Phasianidae</div>			
<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Bonasa umbellus	ruffed grouse	Present in Park	Resident
Dendragapus canadensis	spruce grouse	Present in Park	Resident
Dendragapus obscurus	blue grouse	Present in Park	Resident
Lagopus lagopus	willow ptarmigan	Present in Park	Resident
Lagopus leucurus	white-tailed ptarmigan	Present in Park	No data
Lagopus mutus	rock ptarmigan	Present in Park	Resident
<div>Order: Gruiformes Family: Rallidae</div>			
<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Fulica americana **	American coot	Present in Park	Migratory
<div>Order: Gruiformes Family: Gruidae</div>			
<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Grus canadensis	sandhill crane	Present in Park	Migratory
<div>Order: Passeriformes Family: Alaudidae</div>			
<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Eremophila alpestris	horned lark	Present in Park	Migratory
<div>Order: Passeriformes Family: Bombycillidae</div>			
<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Bombycilla garrulus	bohemian waxwing	Present in Park	Migratory

APPENDIX C (cont.)

Order: Passeriformes Family: Certhiidae
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<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Certhia americana	Brown creeper	Present in Park	Resident
Troglodytes troglodytes	winter wren	Present in Park	No data

Order: Passeriformes Family: Cinclidae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Cinclus mexicanus	american dipper	Present in Park	Resident

Order: Passeriformes Family: Corvidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Corvus caurinus	northwestern crow	Present in Park	Resident
Corvus corax	common raven	Present in Park	Resident
Cyanocitta stelleri	steller's jay	Present in Park	Resident
Perisoreus canadensis *	gray jay	Present in Park	Vagrant
Pica pica	black-billed magpie	Present in Park	No data

Order: Passeriformes Family: Fringillidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Agelaius phoeniceus	red-winged blackbird	Present in Park	Migratory
Calcarius lapponicus	lapland longspur	Present in Park	Migratory
Carduelis flammea	common redpoll	Present in Park	Migratory
Carduelis pinus	pine siskin	Present in Park	No data
Carduelis tristis **	American goldfinch	Present in Park	Migratory
Dendroica coronata	yellow-rumped warbler	Present in Park	No data
Dendroica petechia	yellow warbler	Present in Park	No data
Dendroica striata	blackpoll warbler	Present in Park	Migratory
Dendroica townsendi	townsend's warbler	Present in Park	No data
Euphagus carolinus	rusty blackbird	Present in Park	Migratory
Geothlypis trichas	common yellowthroat	Present in Park	No data
Junco hyemalis	dark-eyed junco	Present in Park	Resident
Leucosticte arctoa	rosy finch	Present in Park	Migratory
Loxia curvirostra	red crossbill	Present in Park	Resident
Loxia leucoptera	white-winged crossbill	Present in Park	Resident
Melospiza lincolni	lincoln's sparrow	Present in Park	No data
Melospiza melodia	song sparrow	Present in Park	No data
Molothrus ater	brown-headed cowbird	Present in Park	Vagrant
Oporornis tolmiei	macgillivray's warbler	Present in Park	No data
Passerculus sandwichensis	savannah sparrow	Present in Park	No data
Passerella iliaca	fox sparrow	Present in Park	No data

APPENDIX C (cont.)

Pinicola enucleator	pine grosbeak	Present in Park	Resident
Piranga ludoviciana	western tanager	Present in Park	No data
Plectrophenax nivalis	snow bunting	Present in Park	Migratory
Seiurus noveboracensis	northern waterthrush	Present in Park	No data
Setophaga ruticilla	american redstart	Present in Park	No data
Spizella arborea	american tree sparrow	Present in Park	No data
Spizella passerina	chipping sparrow	Present in Park	Migratory
Vermivora celata	orange-crowned warbler	Present in Park	No data
Vermivora peregrina *	tennessee warbler	Present in Park	No data
Wilsonia pusilla	wilson's warbler	Present in Park	No data
Zonotrichia atricapilla	golden-crowned sparrow	Present in Park	No data
Zonotrichia leucophrys	white-crowned sparrow	Present in Park	Migratory

Order: Passeriformes Family: Hirundinidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Hirundo pyrrhonota	cliff swallow	Present in Park	Vagrant
Hirundo rustica	barn swallow	Present in Park	No data
Riparia riparia	bank swallow	Present in Park	Migratory
Tachycineta bicolor	tree swallow	Present in Park	No data
Tachycineta thalassina	violet-green swallow	Present in Park	No data

Order: Passeriformes Family: Laniidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Lanius excubitor	northern shrike	Present in Park	Migratory

Order: Passeriformes Family: Muscicapidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Catharus guttatus	hermit thrush	Present in Park	No data
Catharus minimus	gray-cheeked thrush	Probably Present	No data
Catharus ustulatus	swainson's thrush	Present in Park	No data
Myadestes townsendi	townsend's solitaire	Present in Park	Vagrant
Oenanthe oenanthe	northern wheatear	Probably Present	No data
Sialia currucoides	mountain bluebird	Present in Park	Vagrant
Turdus migratorius	american robin	Present in Park	No data

APPENDIX C (cont.)

Order: Passeriformes Family: Paridae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Parus atricapillus	black-capped chickadee	Present in Park	Resident
Parus hudsonicus	boreal chickadee	Present in Park	No data
Parus rufescens	chestnut-backed chickadee	Present in Park	Resident

Order: Passeriformes Family: Passeridae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Anthus rubescens	No info	Present in Park	Migratory

Order: Passeriformes Family: Regulidae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Regulus calendula	ruby-crowned kinglet	Present in Park	No data
Regulus satrapa	golden-crowned kinglet	Present in Park	Resident

Order: Passeriformes Family: Sittidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Sitta canadensis	red-breasted nuthatch	Present in Park	Resident

Order: Passeriformes Family: Sturnidae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Sturnus vulgaris *	european starling	Present in Park	No data

Order: Passeriformes Family: Turdidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Ixoreus naevius	varied thrush	Present in Park	No data

APPENDIX C (cont.)

Order: Passeriformes Family: Tyrannidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Contopus borealis	olive-sided flycatcher	Present in Park	No data
Contopus sordidulus	western wood-pewee	Present in Park	No data
Empidonax alnorum *	alder flycatcher	Present in Park	No data
Empidonax difficilis	western flycatcher	Present in Park	No data
Empidonax hammondi	Hammond's flycatcher	Present in Park	No data
Sayornis saya	say's phoebe	Present in Park	Migratory
Tyrannus verticalis	western kingbird	Probably Present	No data

Order: Passeriformes Family: Vireonidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Vireo gilvus	warbling vireo	Present in Park	No data

Order: Piciformes Family: Picidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Colaptes auratus	northern flicker	Present in Park	Migratory
Picoides pubescens	downy woodpecker	Present in Park	Resident
Picoides tridactylus *	three-toed woodpecker	Present in Park	Resident
Picoides villosus	hairy woodpecker	Present in Park	Resident
Sphyrapicus ruber	red-breasted sapsucker	Present in Park	Migratory

Order: Procellariiformes, Family: Hydrobatidae

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Oceanodroma furcata **	fork-tailed storm-petrel	Present in Park	Vagrant

Order: Strigiformes Family: Caprimulgidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Chordeiles minor	common nighthawk	Probably Present	Vagrant

APPENDIX C (cont.)

Order: Strigiformes Family: Strigidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Aegolius acadicus **	northern saw-whet owl	Present in Park	Resident
Aegolius funereus **	boreal owl	Present in Park	No data
Asio flammeus	short-eared owl	Present in Park	Migratory
Bubo virginianus	great horned owl	Present in Park	Resident
Glaucidium gnoma	northern pygmy-owl	Present in Park	Resident
Nyctea scandiaca	snowy owl	Probably Present	Vagrant
Otus kennicottii	western screech-owl	Probably Present	Resident
Strix varia	barred owl	Probably Present	Migratory
Surnia ulula **	northern hawk owl	Present in Park	Migratory

Order: Trochiliformes Family: Trochilidae
--

<u>Scientific Name</u>	<u>Common Name</u>	<u>Park Status</u>	<u>Residency</u>
Selasphorus rufus	rufous hummingbird	Present in Park	No data